

# Precision Departure Release Capability (PDRC)

## NASA to FAA Research Transition

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On behalf of NASA's Airspace Systems Program

6 August 2013

# PDRC Highlights



- Potential to assist in tactical departure clearances impacting metered airports
  - Over 30,000 aircraft per month will get improved departure clearances into constrained overhead/enroute flows
  - 22% of arrival aircraft will have significantly improved arrival meter schedules
- A field-validated automation tool leveraged off existing FAA systems (TMA and SDSS)
  - OFF Time compliance improvement from 54% to 83%
  - Nearly a 1-minute improvement in both mean and standard deviation of OFF Time predictability
- Concept of Operations, Technology Description and Operational Evaluation results all handed over to the FAA



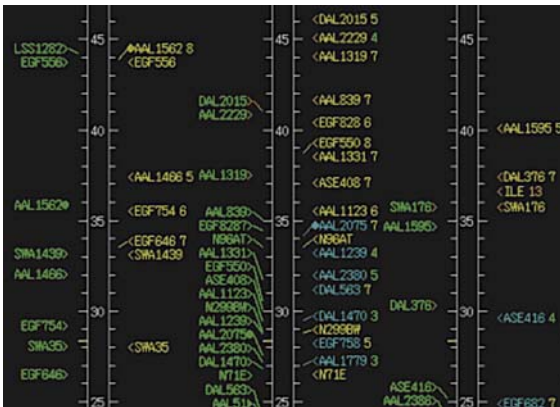
150,000+ TMA Metered flights in January 2011

~34,000 or 1/5  
were tactically

PDRC has the potential to significantly improve and increase tactical departure clearance compliance to metered airports

20,000 Non-metered arrivals

>10,000 outbound  
tactically scheduled



# Today's Departure Operations



ARTCC



## Technology Imbalance

En route trajectory-based  
decision support tool develops  
tactical departure schedules  
using...



ARTCC

TRACON

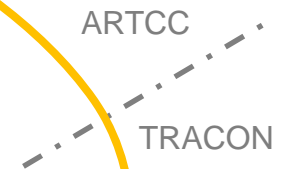
Manually-computed OFF time  
predictions



# Today's Departure Operations



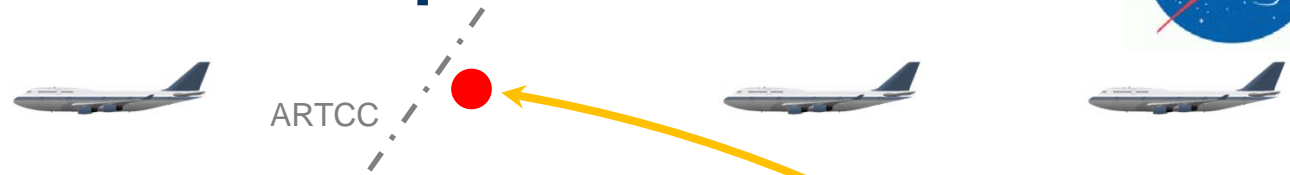
## Technology Imbalance



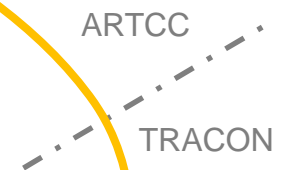
Can be addressed with information from NextGen surface trajectory-based operations tools



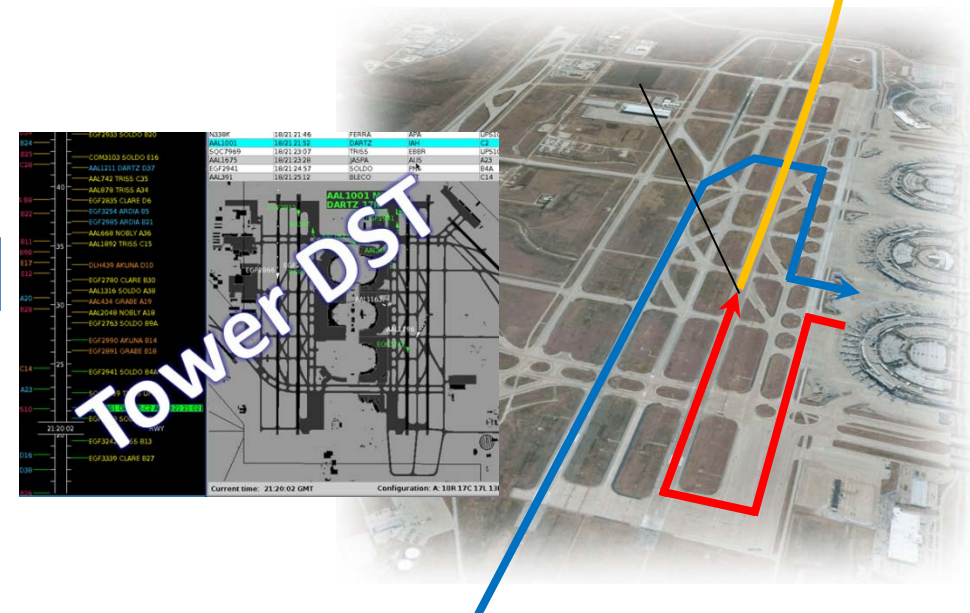
# PDRC Concept Overview



Communication of assigned OFF times and more accurate departure scheduling

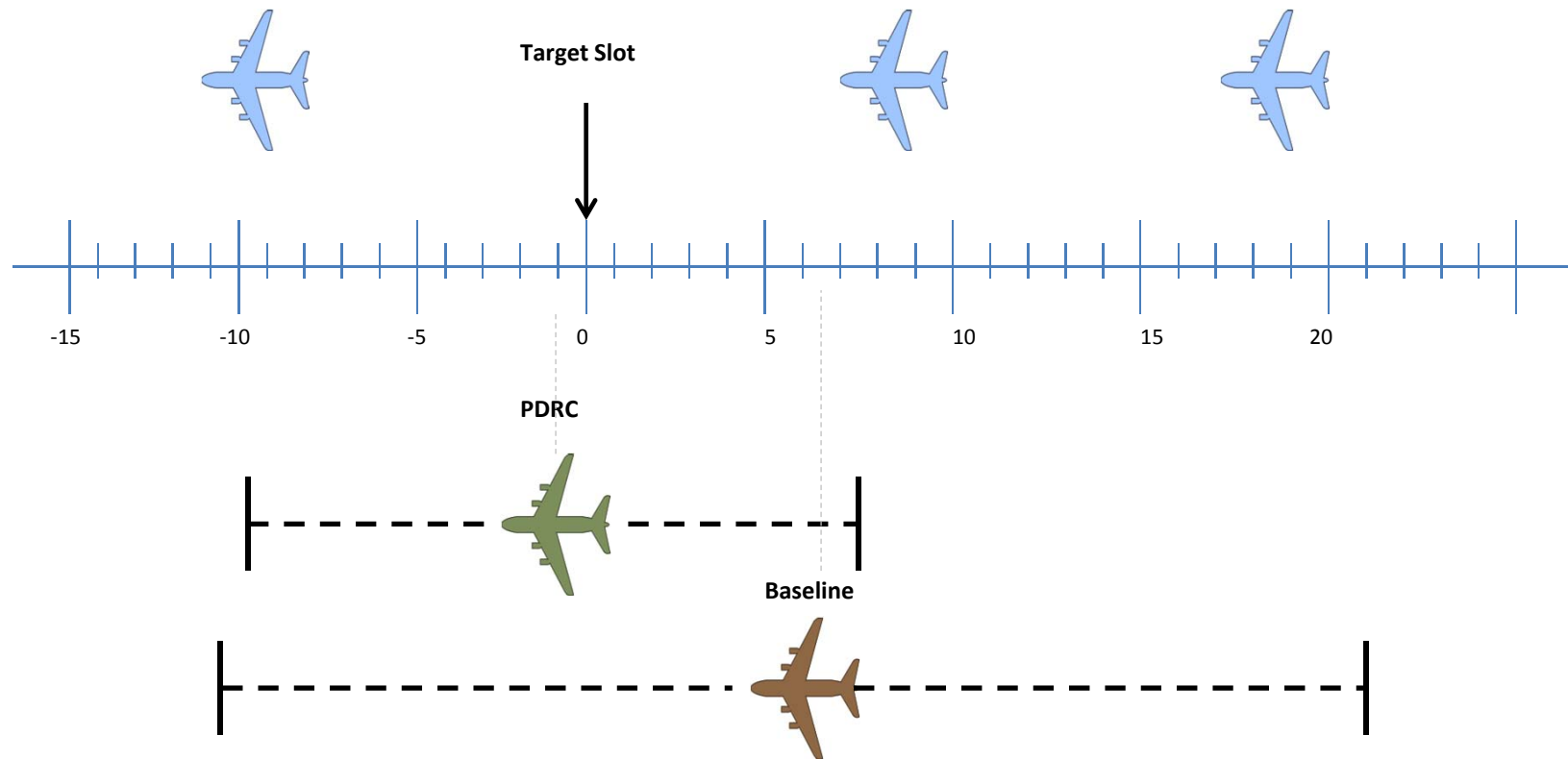


Surface system OFF times and runway assignments predictions





# Improved Ability to Fit into Overhead Stream



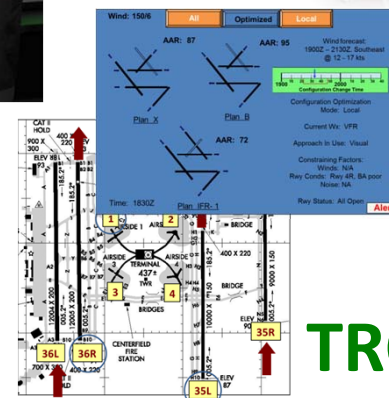
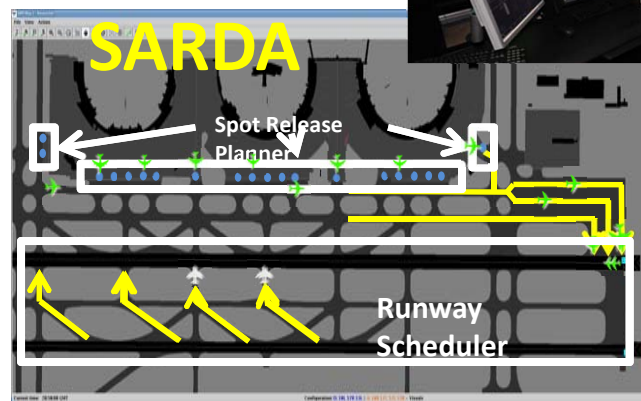
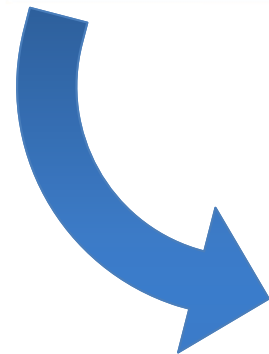
# Integrated Arrival/Departure/Surface System



Meter Point

PDRC

1. 1000000	1. 1000000	1. 1000000	1. 1000000	1. 1000000
2. 1000000	2. 1000000	2. 1000000	2. 1000000	2. 1000000
3. 1000000	3. 1000000	3. 1000000	3. 1000000	3. 1000000
4. 1000000	4. 1000000	4. 1000000	4. 1000000	4. 1000000
5. 1000000	5. 1000000	5. 1000000	5. 1000000	5. 1000000
6. 1000000	6. 1000000	6. 1000000	6. 1000000	6. 1000000
7. 1000000	7. 1000000	7. 1000000	7. 1000000	7. 1000000
8. 1000000	8. 1000000	8. 1000000	8. 1000000	8. 1000000
9. 1000000	9. 1000000	9. 1000000	9. 1000000	9. 1000000
10. 1000000	10. 1000000	10. 1000000	10. 1000000	10. 1000000



# IADS Research Transition Team



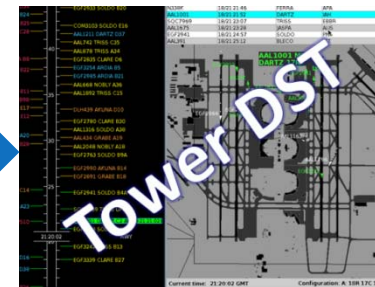
- NASA and FAA established the Research Transition Teams to ensure NASA's NextGen R&D products are identified, quantified, and effectively transferred to the FAA.
- Key PDRC events in coordinating transition of NASA research products
  - Jun 2009            NASA initiated PDRC research activity
  - Sep 2009            PDRC product defined in IADS RTT plan
  - Sep 2010            PDRC TIM @ NASA Ames
  - Mar 2011            PDRC briefing and demo at ASP TIM
  - Nov 2011            PDRC stakeholder update @ FAA HQ
  - Jun 2012            preliminary PDRC tech transfer
  - Jun 2013            final PDRC tech transfer
- Represented by:
  - NASA NextGen SAIE Project
  - FAA NextGen organization (ANG) and Air Traffic Organization (ATO)
- Next meeting August 7<sup>th</sup> to discuss selected IADS RTT efforts.

# Prototype System Overview



## Traffic Management Advisor (TMA)

- 1997 NASA → FAA tech transfer
- FAA further developed and deployed throughout the NAS



## Surface Decision Support System (SDSS)

- 2004 NASA → FAA tech transfer
- NASA and FAA use for NextGen surface research and TFDM development

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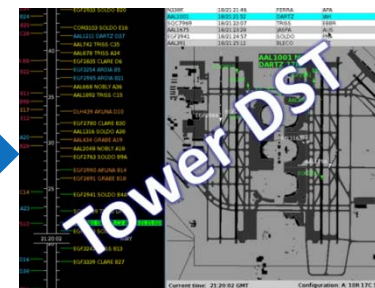


## PDRC enhancements

- Two-way data exchange between tools
- Enable use of surface information (predicted runway and OFF time) in TMA departure scheduling
- Automate Center/Tower release time coordination
- Departure prediction improvements for both TMA and SDSS

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# NASA/FAA Collaboration



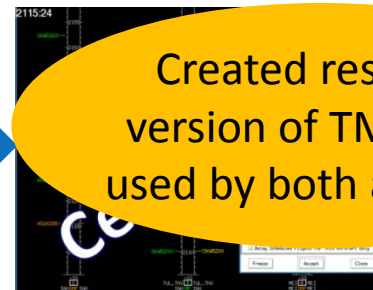
## PDRC enhancements

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- Enable use of surface information (predicted runway and OFF time) in TMA departure scheduling
- Automate Center/Tower release time coordination
- Departure prediction improvements for h

Tactical surface data exchange (TSDE) air carrier interface

## Traffic Management Advisor (TMA)

- 1997 NASA → FAA tech transfer
- FAA further developed and deployed throughout the NAS



Created research version of TMA now used by both agencies



Collaborate on SDSS development for NextGen surface R&D

## Surface Decision Support System (SDSS)

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# PDRC Operational Evaluations

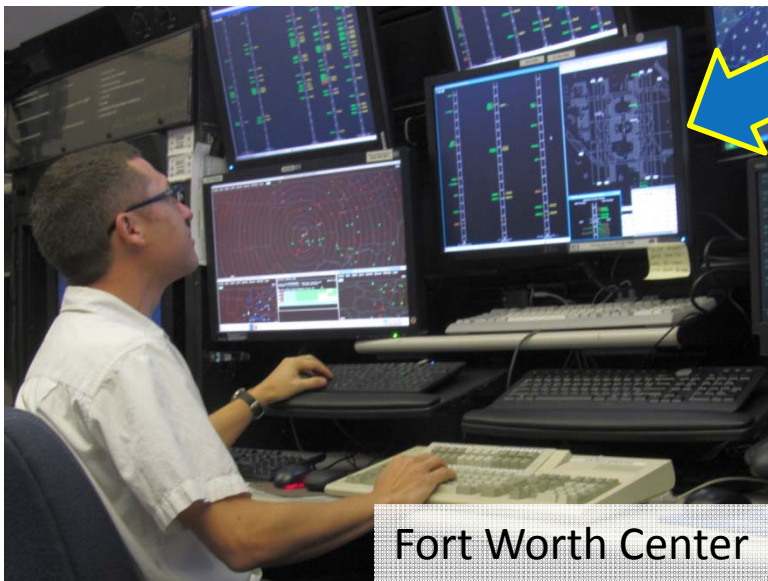


## Objectives

- Validate PDRC concept
- Demonstrate system performance



DFW Tower



Fort Worth Center



# PDRC Operational Evaluations

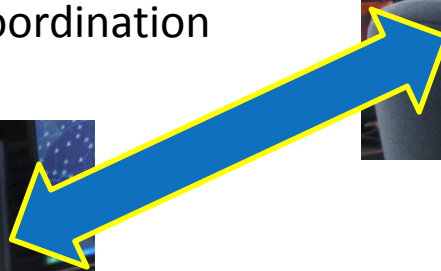
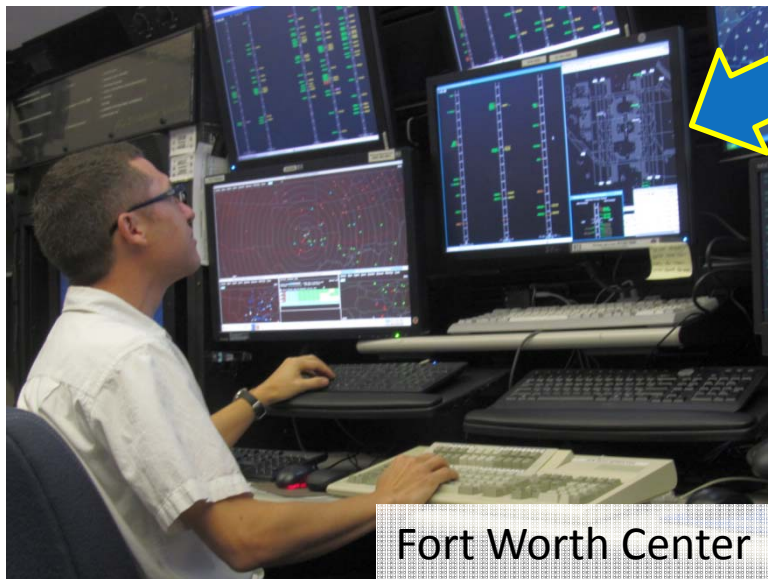


## Objectives

- Validate PDRC concept
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## Environment and Methodology

- DFW Tower and Fort Worth Center TMU
- Operational flights subject to Call For Release
- Use PDRC for OFF time predictions, scheduling and release time coordination



# PDRC Operational Evaluations

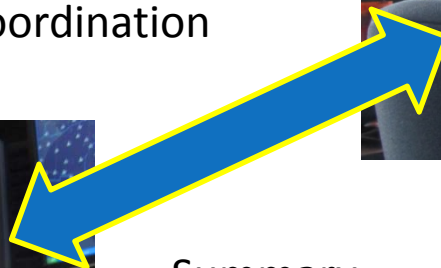
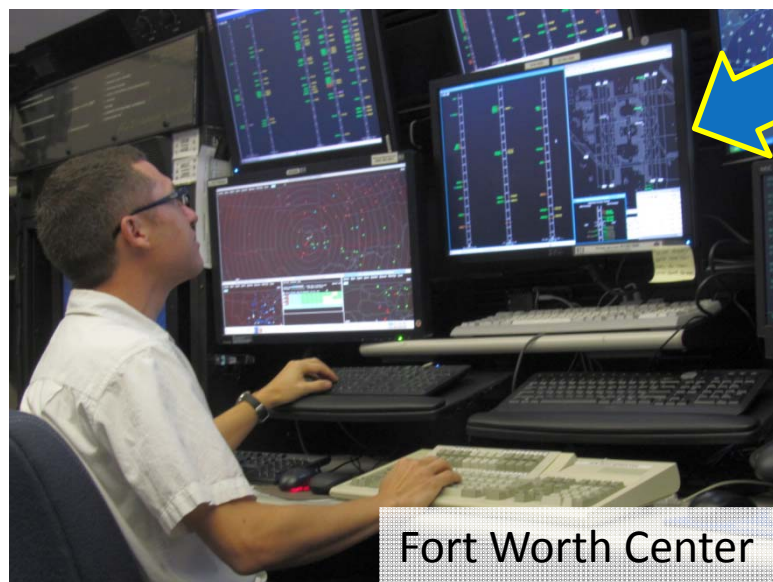


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## Summary

- Two phase evaluation over 29 weeks
  - May 2012 – Jul 2012      120 flights
  - Nov 2012 – Feb 2013      118 flights
- Block 2 includes new versions of SDSS and TMA plus adaptation upgrades

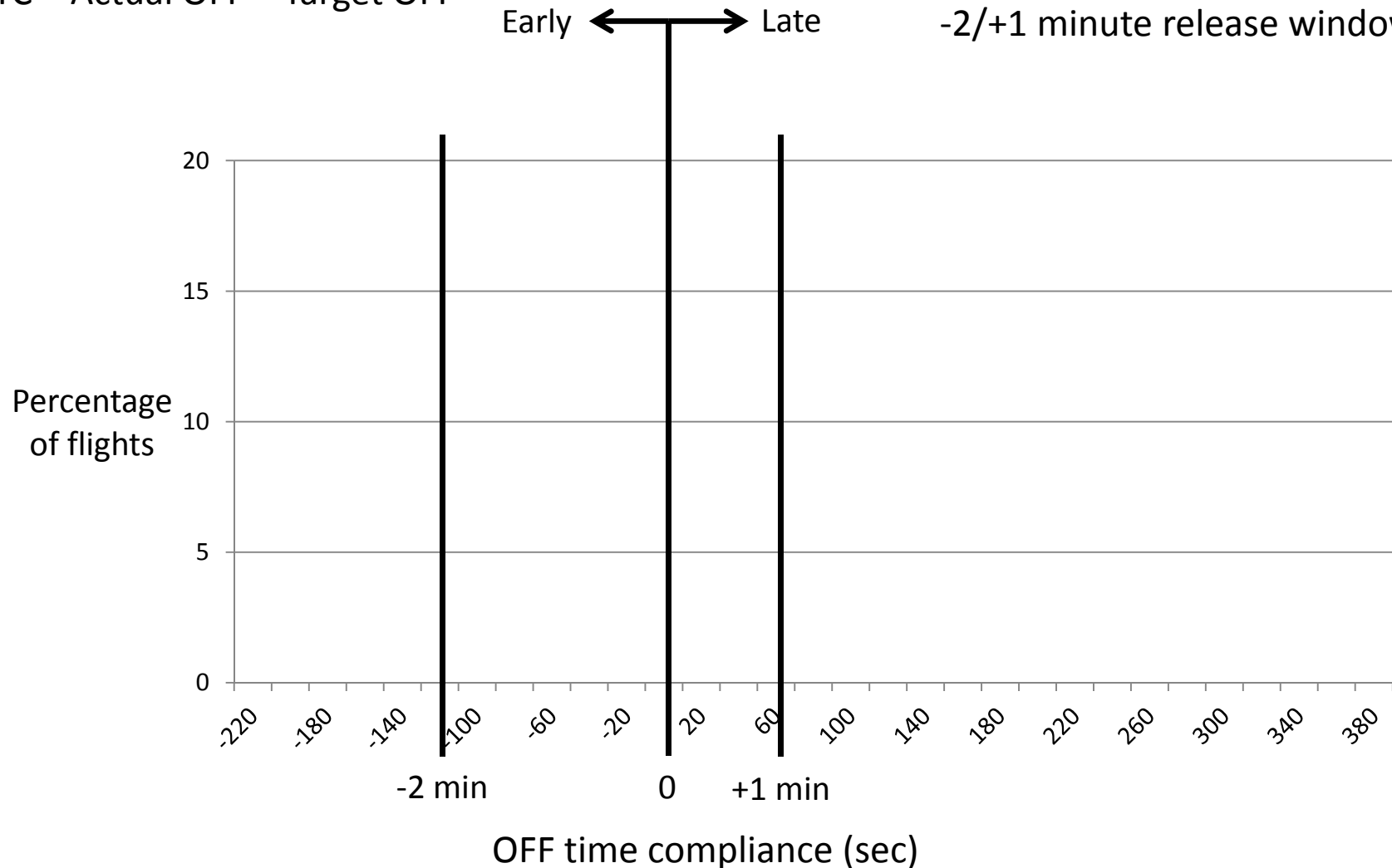
# OFF Time Compliance Improvements



OFF Time Compliance (OTC)

OTC = Actual OFF – Target OFF

Call for Release operations  
generally seek to meet a  
-2/+1 minute release window

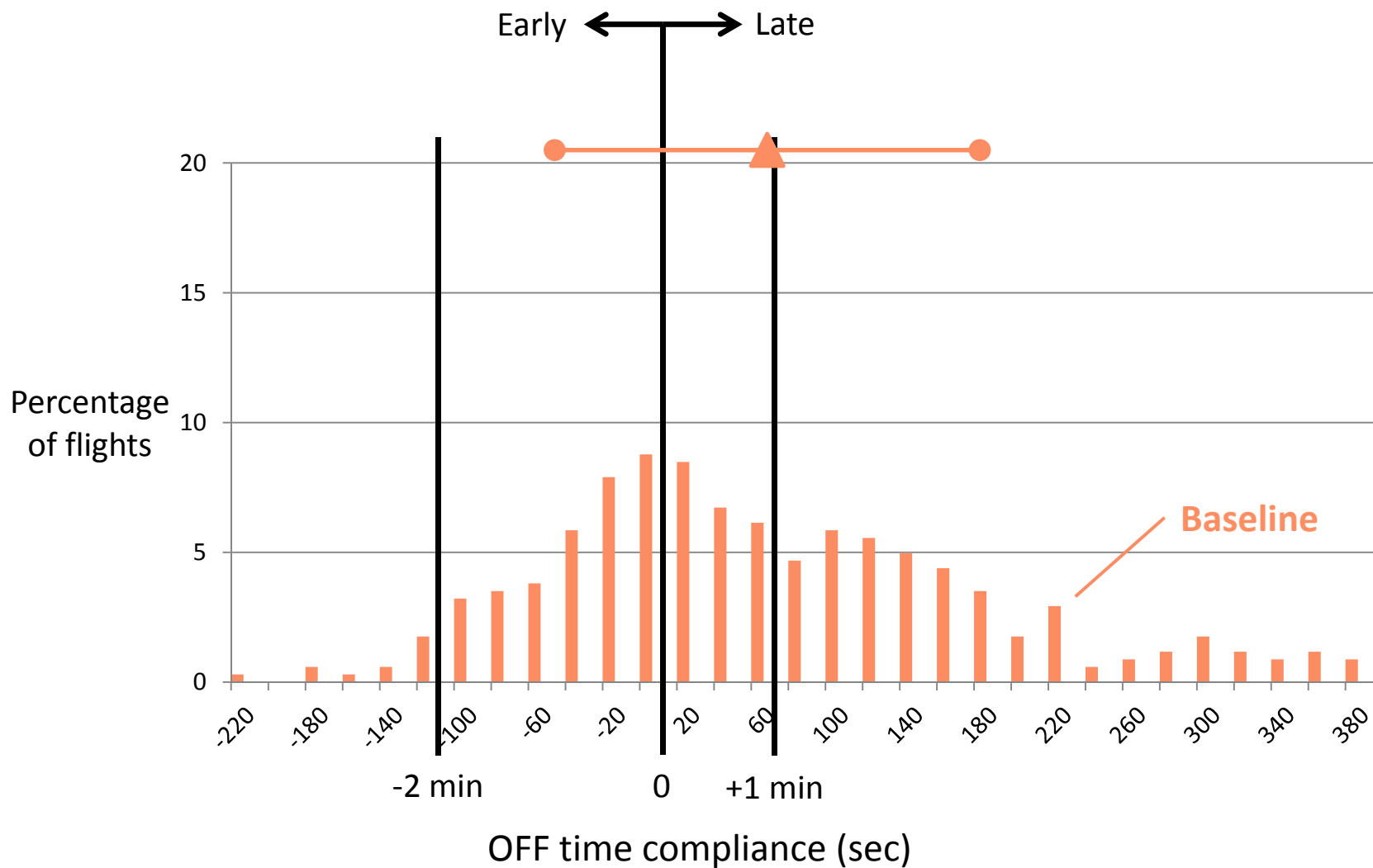


# OFF Time Compliance Improvements



Comply with -2/+1 window

Baseline = 54%



# OFF Time Compliance Improvements



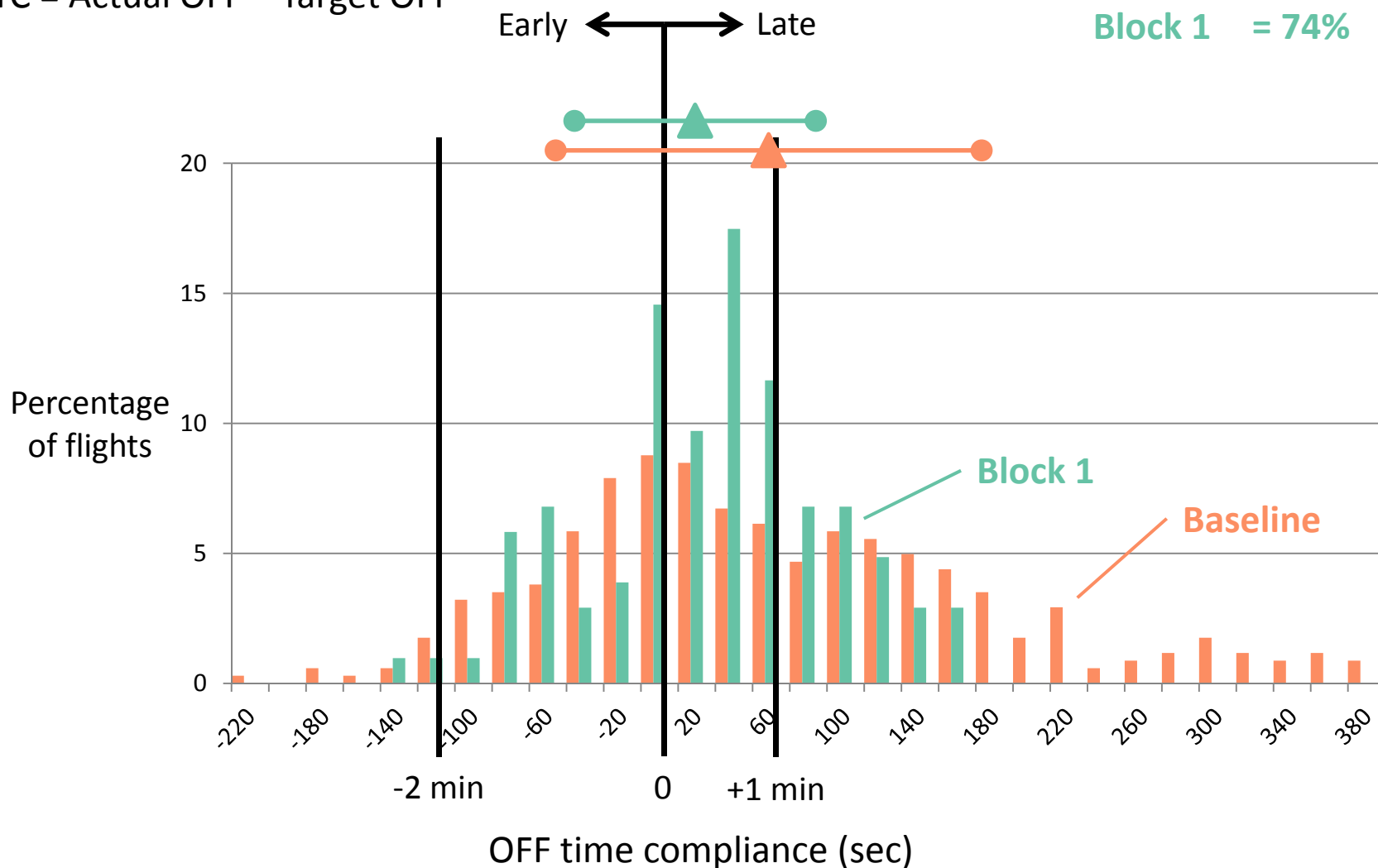
OFF Time Compliance (OTC)

OTC = Actual OFF – Target OFF

Comply with -2/+1 window

Baseline = 54%

Block 1 = 74%



# OFF Time Compliance Improvements



OFF Time Compliance (OTC)

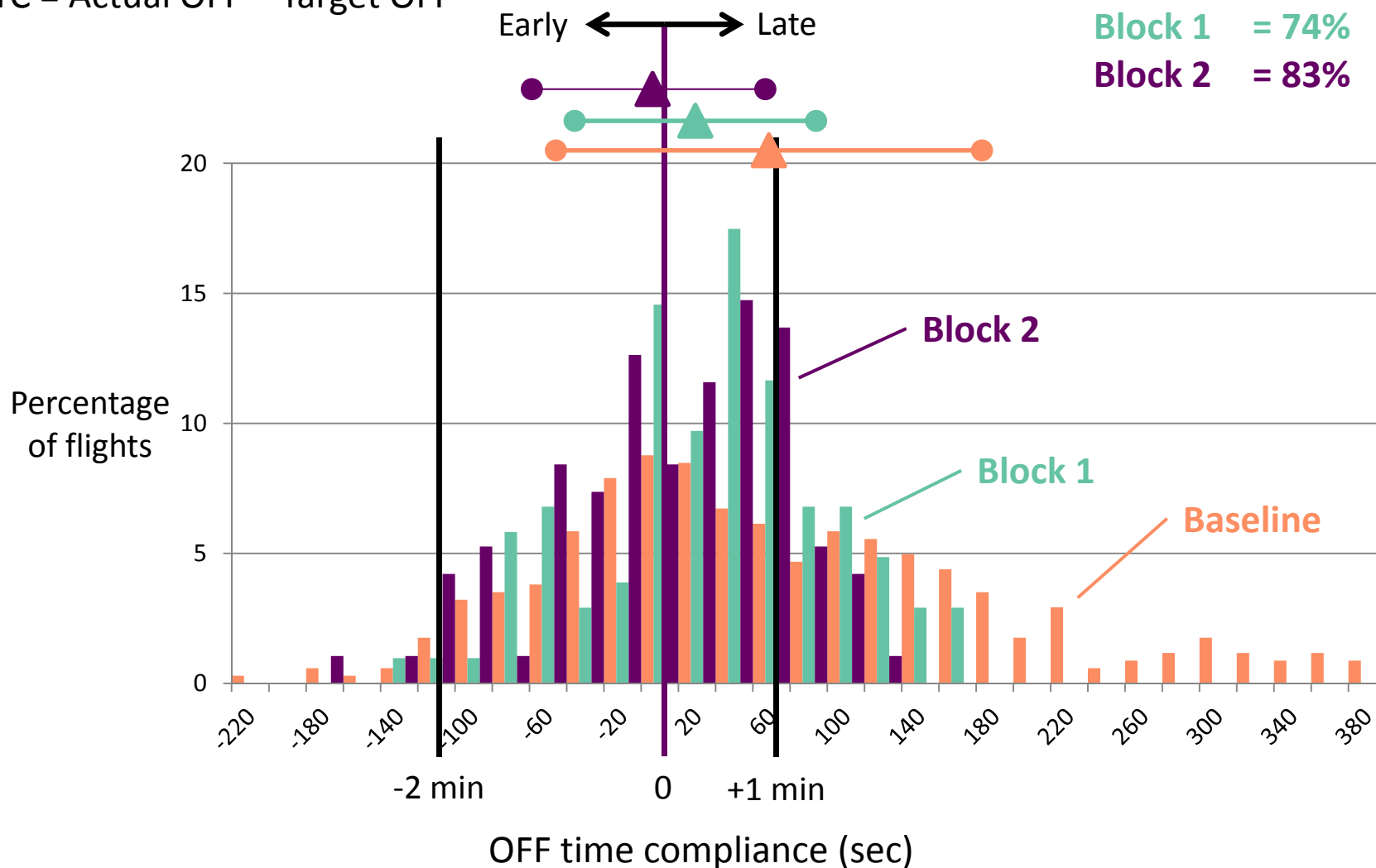
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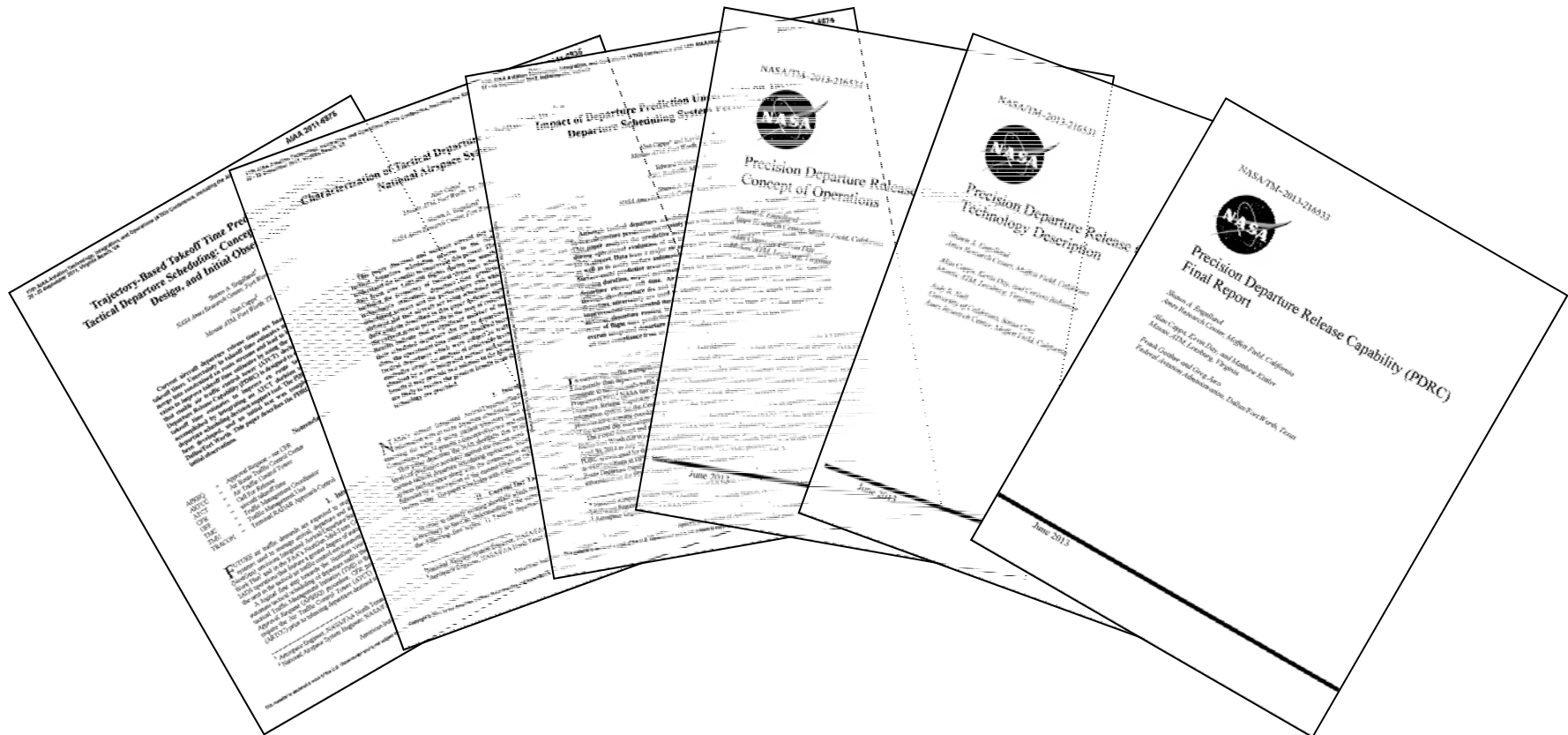
Baseline = 54%

Block 1 = 74%

Block 2 = 83%



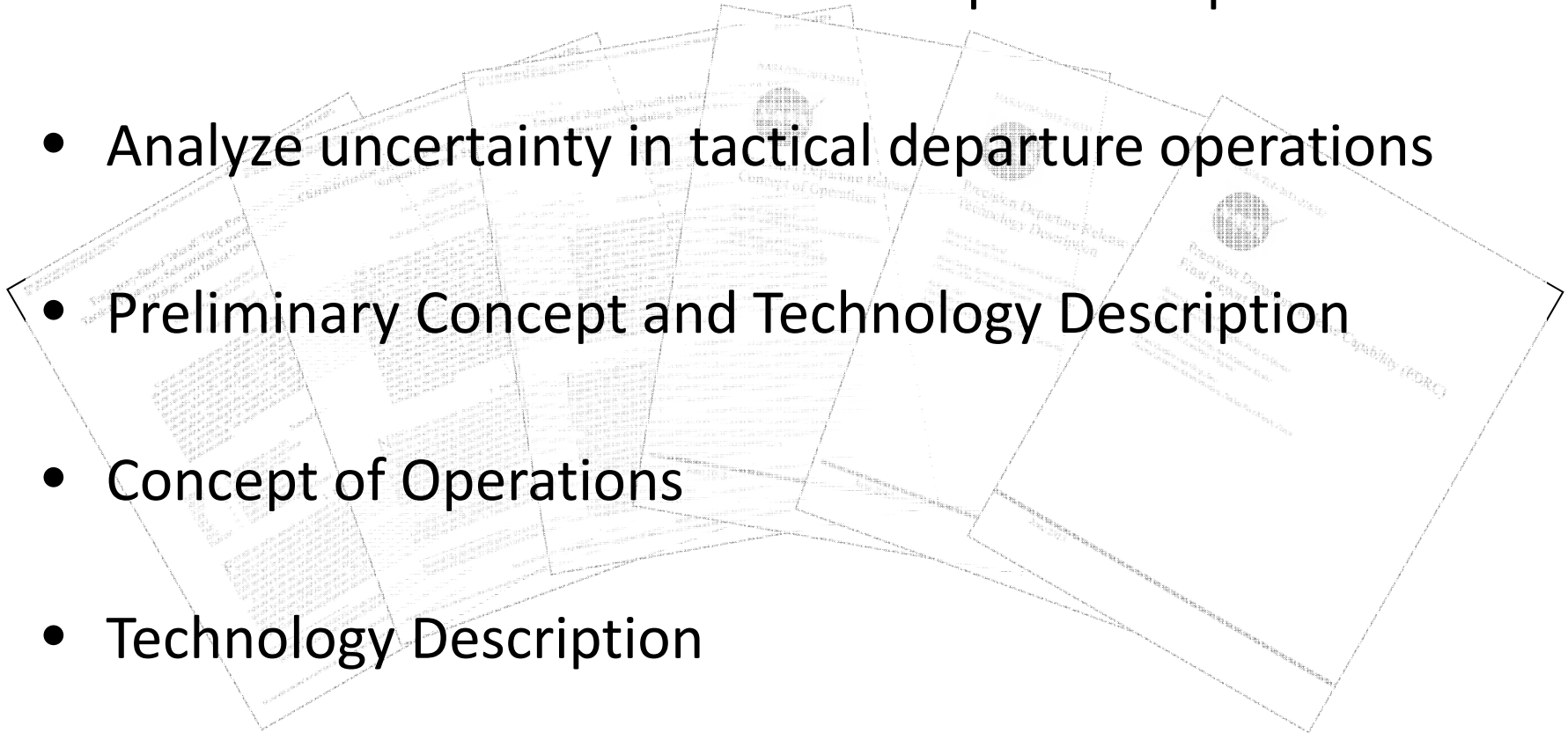
# PDRC Research Products





# PDRC Research Products

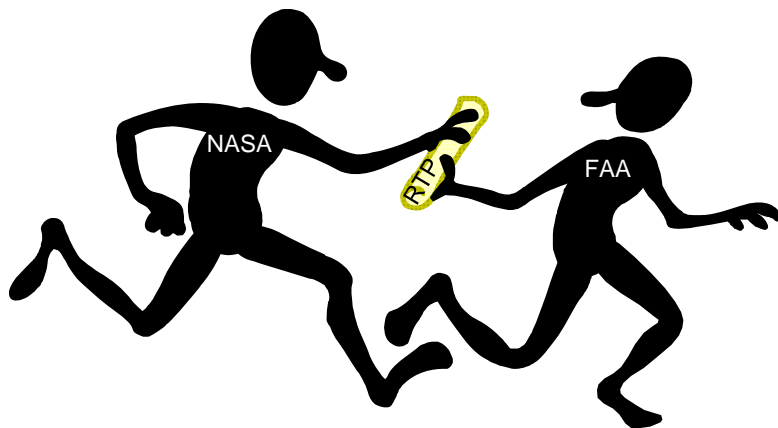
- Characterize NAS-wide tactical departure operations
- Analyze uncertainty in tactical departure operations
- Preliminary Concept and Technology Description
- Concept of Operations
- Technology Description
- Operational evaluation results



# NASA/FAA Research Partnerships



- FAA NextGen organization (ANG)
  - Facilitated tech transfer via Research Transition Team
  - Joint development of Surface Decision Support System
  - Supported enhancements to TMA
  - Collaborated on two-way air carrier interface
- FAA Air Traffic Organization (ATO)
  - Provided input on PDRC development and evaluation plans
  - Active, ongoing dialogue to ensure successful research transition
  - DFW TRACON (D10) and Fort Worth Center (ZFW) test/eval



Key to success was jointly defining what the “baton” needed to be and where the exchange was to occur.

## Next Steps



- PDRC is complete
- New work will be planned within the IADS RTT
- Future tactical departure scheduling research builds on the PDRC foundation

